CHAPTER 5

OPERATION SYSTEMS

LIST OF EFFECTIVE PAGES

PAGE	REVISION	PAGE	REVISION
LEP 5-1	22		
5-i	22		
5-ii	22		
5-iii	8		
5-iv	22		
5.1-1	20		
5.1-2	20		
5.1-3	20		
5.1-4	20		
5.1-5	22		
5.1-6	22		
5.1-7	22		
5.1-8	22		
5.1-9	22		
5.2-1	22		
5.3-1	22		
5.4-1	22		
5.5-1	15		
5.6-1	15		
5.7-1	8		
Figure 5.1-1 - Page 1	1		
Figure 5.1-1 - Page 2	2		
Figure 5.1-1 - Page 3	1		
Figure 5.1-2 - Page 1	1		
Figure 5.1-2 - Page 2	1		
Figure 5.1.2 - Page 3	1		

CHAPTER 5

OPERATION SYSTEMS

TABLE OF CONTENTS

CHAPTER 5

<u>OPERATION SYSTEMS</u>

TABLE OF CONTENTS

CHAPTER 5

OPERATION SYSTEMS

LIST OF FIGURES

FIGURE

CHAPTER 5

OPERATION SYSTEMS

LIST OF ACRONYMS

DSC	Dry Shielded Canister
HSM	Horizontal Storage Module
HSM-HB	High Burnup Horizontal Storage Module
ISFSI	Independent Spent Fuel Storage Installation
NUHOMS	Nutech Horizontal Modular Storage®
VDS	Vacuum Drying System

5.0 OPERATION SYSTEMS

5.1 OPERATION DESCRIPTION

This chapter describes the operation of the Calvert Cliffs Independent Spent Fuel Storage Installation (ISFSI). The narrative describes operations unique to the Nutech Horizontal Modular Storage® (NUHOMS) systems, such as draining, drying, and closure of the dry shielded canister (DSC). Although some operational details are provided, the description is not intended to limit or restrict operation of the facility. Operational procedures may be revised according to the requirements of the plant, provided that the limiting conditions of operation are not exceeded. Standard fuel handling and cask handling operations performed under the plant's Title 10 Code of Federal Regulations Part 50 license are described in less detail.

5.1.1 NARRATIVE DESCRIPTION

The following steps are a description of the operating procedures for the NUHOMS system. They do not substitute for the procedure itself. A flowchart of these operations is provided in Figures 5.1-1 and 5.1-2.

5.1.1.1 Preparation of the Transfer Cask and the Dry Shielded Canister

Prior to storage, all candidate fuel assemblies are evaluated, using plant records or other means, to verify that they meet the physical, thermal, and environmental criteria specified in the Technical Specifications. Only fuel assemblies meeting the Technical Specification 1.0.j definition of undamaged fuel will be placed into storage in the ISFSI. Current emphasis on fuel reliability, related to operational concerns, results in identification of failed rods whenever it is believed that a significant number of failed rods could reside within the core.

When cladding defects are identified, the failed rods are removed from the fuel assemblies before reinserting them into the core. The assemblies are then no longer classified as "failed." (The failed rods are either stored in pin baskets, or encapsulation tubes, which will not be stored in the ISFSI). The fuel assemblies can then either be reinserted in the core, or after the proper cool-down time, put into storage in the ISFSI.

While a records search will confirm that those fuel assemblies designated for storage in the ISFSI are not among those that have been classified as failed, unless they have been repaired as described above, no special inspections to locate cladding defects are planned for the fuel assemblies prior to storage in the ISFSI. However, inert gas (helium or nitrogen) will be required for NUHOMS-32P DSC blow down if reactor records or fuel qualification tests results are not available to demonstrate that all fuel assemlbies to be loaded do not contain fuel rods with breached cladding (Technical Specification 1.0.i definition of intact fuel assembly).

The transfer cask is lifted from the trailer to the 69' level of the Auxiliary Building and lowered into the cask washdown pit with the Spent Fuel Cask Handling Crane and the transfer cask lifting yoke. Scaffolding or a permanent support structure is provided to allow access to the top cover plate and the surface of the cask. The top cover plate is removed and the cask prepared for service.

The DSC is unpacked, cleaned, and examined for any physical damage which may have occurred since the receipt inspection. The DSC is lifted by the Spent Fuel Cask Handling Crane. The DSC is lowered into the cask and rotated as necessary to match the cask alignment marks.

The cask/DSC annulus is filled with clean, demineralized water. The inflatable seal is placed into the upper cask liner recess and pressurized with compressed air. The DSC cavity is filled with borated water from the fuel pool or an equivalent source. The top shield plug is placed on the DSC to ensure it fits properly and then the plug is removed.

The cask lifting yoke is positioned over the transfer cask and the cask lifting trunnions engaged. The yoke lifting hooks are properly positioned and engaged on the cask trunnions, and temporary scaffolding is moved away from the cask as necessary. The cask is lifted and positioned over the spent fuel pool. Prior to lifting the cask, the water level of the pool is adjusted as necessary to accommodate the cask/DSC volume. If the borated water in the DSC was obtained from the fuel pool, a level adjustment may not be required. The spent fuel pool boron concentration is verified prior to fuel loading.

5.1.1.2 Fuel Loading

The transfer cask is lowered into the spent fuel pool. The yoke is disengaged from the trunnions and moved clear of the cask. Using the fuel handling machine, one of the assemblies selected for storage is removed from the fuel rack and positioned over the DSC. The assembly is inserted into the basket guide sleeve according to the DSC loading plan. This process is repeated until all guide sleeves are filled. After the DSC has been fully loaded, the identity and location of each fuel assembly in the DSC is checked and recorded using an underwater TV camera or special optical equipment suitable for this purpose. When the identity of all fuel assemblies in the DSC has been verified, the shield plug assembly is positioned over the DSC, and lowered until it is properly seated.

The lifting yoke is engaged to the cask trunnions and visually verified that it is properly positioned and engaged. The transfer cask is raised, stopping vertical movement prior to breaking the surface of the pool. The top shield plug is inspected to verify that it is properly seated on the DSC. If it is not, the cask is lowered and the shield plug assembly repositioned. The cask is raised from the pool and the exposed portion sprayed with demineralized water. Any excess water is drained from the top of the DSC shield plug assembly back into the pool. The radiation levels at the center and perimeter of the top shield plug assembly and around the exposed surface of the cask are checked. The cask is lifted from the pool and moved to the cask washdown pit.

5.1.1.3 Cask/Dry Shielded Canister Drying Process

The rigging cables are disengaged from the top shield plug and the eyebolts are removed. The lifting yoke is disengaged from the trunnions and moved clear of the cask. The radiation levels along the surface of the cask are checked and it is decontaminated as necessary. Scaffolding is placed around the cask so that any point on its surface is easily accessible to personnel. The top shield plug surface and the exposed DSC shell are decontaminated and the inflatable cask/DSC annulus seal is removed. The cask drain line is connected to the cask, the cask cavity drain port is opened, and water drained from the annulus until the water level is approximately 12” below the top edge of the DSC shell. Swipes are taken around the outer surface of the DSC shell and checked for removable contamination. The top shield plug surface and exposed interior of the DSC shell above the top lead plug are dried. Radiation levels along the surface of the top shield plug are checked and temporary shielding is installed as necessary to minimize personnel exposure.

Calvert Cliffs performs a cost-benefit analysis to determine whether additional shielding is to be prescribed. The primary consideration in the analysis is the exposure incurred installing and removing the shielding vs. performing the task without shielding. While no specific radiation level is defined for implementing additional shielding, consideration is also given to the repetitiveness of the task in keeping the collective dose ALARA.

Exception is taken to a specification implied by Table 12-1 of the Nuclear Regulatory Commission Safety Evaluation Report included in Reference 1.2, limiting the time allowed to drain the DSC following removal from the fuel pool. The intent of the specification is not stated explicitly, but it can be inferred from the reference that its purpose is to provide additional margin for subcriticality by preventing reduced moderator density due to boiling. Optimum moderator density is analyzed explicitly and is assumed to occur for all design conditions. Since subcriticality is demonstrated by analysis for all conditions assuming that optimum moderator conditions apply, technical justification for such a limit does not appear to apply to the Calvert Cliffs fuel and DSC design.

The vacuum drying system (VDS) is connected to the DSC siphon and vent ports, and the liquid pump is used to pump approximately 40 to 60 gallons of water from the canister to the fuel pool in order to lower the water level in the DSC below the vent port opening. The VDS is disconnected from the DSC, and the vent port is opened to ensure that the DSC internal pressure remains atmospheric during the closure weld operation. Before welding or cutting of the top shield plug begins, a small tube is inserted into the DSC vent port. A hydrogen monitor is connected to the tube to continuously sample for hydrogen gas during the top shield plug welding/cutting process. If the hydrogen concentration reaches 60% of the lower flammability limit, welding/cutting activities will stop. The DSC air space will then be purged with filtered plant air. The top shield plug is tack welded to the DSC shell using the automatic welding machine. The shield plug seal weldment is placed and the automatic welding machine removed.

The VDS is connected to the DSC. The remaining water from the DSC cavity is removed by engaging the compressed helium supply, compressed nitrogen supply, or a compressed air source through the VDS and opening the valve to the DSC vent port, forcing the water from the DSC through the siphon port. When water stops flowing from the DSC, the siphon port valve is closed. The valve on the suction side of the vacuum pump is opened, the pump started, and a vacuum of 3 torr or less is drawn in the DSC cavity. The pressure in the DSC is reduced in steps to prevent the formation of ice in the DSC cavity or in the VDS. After pumping down to each level, the pump should be valved off and the cavity pressure monitored. The cavity pressure will rise as water and other volatiles in the cavity evaporate. When the cavity pressure stabilizes, the pump is reactivated and the pumpdown continued to the next step. It may be necessary to repeat some steps, depending on the rate and the extent of the pressure increase. After the DSC internal pressure is stabilized at 3 torr or less, the valve in the helium inlet is opened to allow helium to flow into the DSC. The DSC is pressurized with helium to 22 psia and the shield plug seal weld tested for leakage. After the seal welds' integrity is confirmed, the DSC is re-evacuated to 3 torr and backfilled with helium to a cavity pressure of 17.2 psia.

The maximum leakage rate is 10^{-4} atm-cc/sec. This is the lowest rate measurable for use with portable helium leak detectors. If a pressure of 1.5 atm developed within the DSC cavity for a period of 10 years, a leak rate of 10^{-4} atm-cc/sec would allow 47,300 cm^3 of helium to escape. This would be insignificant compared to the $6.75x10^6 cm^3$ of helium in the DSC initially. An alternate method of filling the DSC with a measured quantity of helium, 837 gm $\pm$ 120 gm, is acceptable.

5.1.1.4 Dry Shielded Canister Closure Operations

The VDS is disconnected from the DSC and the prefabricated plugs are seal welded over the DSC vent and siphon port openings. The top cover plate is placed over the shield plug. After proper fit-up between the plate and the DSC shell is verified, the top cover plate is tack welded to the shell using the automatic welding machine. The cover plate final closure weld is placed. The automatic welding machine is removed from the DSC. The cask drain port valve is opened and the remaining water removed from the cask/DSC annulus. The transfer cask cover plate is rigged, lowered onto the transfer cask, and bolted into place.

5.1.1.5 Transport of Cask to Transfer Trailer Skid and Horizontal Storage Module

When the transfer trailer and cask support skid are prepared for service, the scaffolding is moved away from the cask as necessary, and the lifting yoke is engaged with the cask trunnions. The cask is lifted from the cask washdown pit, moved to a location over the transfer trailer, and lowered until the lower trunnions rest in the cask support skid pillow blocks. The crane is moved forward while the cask is lowered until the cask upper trunnions are just above the skid upper trunnion pillow blocks. The positioning of the cask is inspected to ensure that the upper trunnions and pillow blocks are properly aligned, and the cask is lowered until the upper trunnions rest on the pillow blocks. The trunnions are inspected to ensure that they are properly seated and then the top halves of the pillow blocks are installed. The bottom ram access cover plate is removed from the cask and the temporary shield plug is installed. The ram support frame is installed on the bottom of the transfer cask.

5.1.1.6 Loading of Dry Shielded Canister into the Horizontal Storage Module

Prior to moving the cask from the Auxiliary Building, the horizontal storage module (HSM) door is removed from the HSM/HSM-HB (high burnup horizontal storage module) using a portable crane and the HSM/HSM-HB interior is inspected for debris. The doors on adjacent HSMs/HSM-HBs should remain in place. The air inlets and outlets are inspected to ensure that they are clear and free of debris, and the inlet and outlet screens are inspected for damage.

A suitable truck or tractor is used to transport the cask to the ISFSI along the designated route. Once at the ISFSI, the trailer is backed to within a few feet of the HSM/HSM-HB, and the position of the trailer checked to ensure that the centerlines of the cask and the HSM/HSM-HB approximately coincide. The trailer is repositioned if necessary. The cask top cover plate is removed using a portable crane. The trailer is backed to within a few inches of the HSM/HSM-HB, the trailer brakes set and the tractor disengaged. The towing vehicle is driven away from the transfer trailer to make room for the hydraulic ram. The hydraulic ram trailer is positioned close to the transfer trailer. The skid positioning system power unit is connected to the positioning system hydraulic panel on the trailer, and powered up. The skid tie-down bracket fasteners are removed and the skid positioning system is used to bring the cask into approximate vertical and horizontal alignment with the HSM/HSM-HB. Optical survey equipment and targets on the cask and the HSM/HSM-HB are used to adjust the position of the cask until it is properly aligned with the HSM/HSM-HB. The longitudinal actuator is used to fully insert the cask into the HSM/HSM-HB opening.

When the cask is aligned and docked at the HSM/HSM-HB, the skid positioning system power unit is powered down and the cask upper trunnions are secured to the front wall of the HSM/HSM-HB with the cask restraints. A portable crane is used to pick the hydraulic ram from its trailer and place it in position behind the cask, with its front trunnions in the ram support frame pillow blocks. The ram rear tripod is placed on the approach slab in approximate horizontal alignment with the cask and the ram leveled. The center section of the shield plug is removed from the bottom of the cask. The ram hydraulic power supply is powered up and the ram extended through the bottom cask opening into the DSC grapple ring. The grapple hydraulic cylinder is activated to engage the grapple arms with the DSC grapple ring. The DSC is inserted into the HSM/HSM-HB by extending the hydraulic ram. The ram is stopped when the DSC reaches the support rail stops at the back of the module.

The ram grapple mechanism is disengaged and the hydraulic ram retracted and removed from the cask. The cask restraints are removed from the HSM/HSM-HB, and the cask skid retracted to its travel position. The DSC seismic restraint is installed, the HSM/HSM-HB door closed, and the door tack welded in place. The radiation dose rates are measured at key locations on the HSM/HSM-HB. The transfer cask top cover plate and ram access shield plug are replaced. The skid is secured onto the trailer, the trailer jacks retracted, the skid positioning system disconnected and the trailer and cask towed to the designated equipment storage area.

5.1.1.7 Monitoring Operations

The HSM air inlet and outlet vents are inspected once every 24 hours to ensure that no debris is obstructing the air flow through the module.

5.1.1.8 Unloading the Dry Shielded Canister From the Horizontal Storage Module

All preliminary operations prerequisite to loading the DSC into the cask (cleaning, etc.) will be performed prior to transporting the cask to the HSM/HSM-HB. The tack welds securing the HSM/HSM-HB door will also be removed.

The cask is placed onto the support skid and trailer and the trailer towed to the HSM/HSM-HB. The ram support frame is installed if it has been removed from the cask and the temporary shield plug installed over the ram access penetration. The trailer is backed to within a few feet of the HSM/HSM-HB and the cask top cover plate removed. The HSM/HSM-HB door and the DSC seismic restraint are removed. The trailer is backed to within a few inches of the HSM/HSM-HB so that the cask is roughly aligned with the module. The skid tie-down brackets are removed and the cask brought into vertical and horizontal alignment with the HSM/HSM-HB. The cask is inserted into the HSM/HSM-HB recess and the cask restraint installed between the HSM/HSM-HB front wall and the cask trunnions. The hydraulic ram system is installed and aligned with the cask and the center ram access penetration temporary shield plug removed. The ram is extended through the cask into the HSM/HSM-HB until it is inserted in the DSC grapple ring. The arms on the ram grapple mechanism are activated and the grapple ring engaged. The ram is retracted and the DSC pulled into the cask. The grapple arms are disengaged and the ram fully retracted from the cask. The ram access penetration temporary shield plug is replaced. The ram and ram mounting assembly are removed. The skid is restored to its travel lock position and secured with the skid tie-down brackets. The HSM/HSM-HB door is replaced and the cask cover plate placed onto the cask and bolted in place. The trailer jacks are lowered and the trailer pulled away from the HSM/HSM-HB.

5.1.1.9 Removal of Fuel from the Dry Shielded Canister

It is Calvert Cliffs Nuclear Power Plant, Inc.'s intent to ship intact DSCs to the repository. Since the issue of compatibility between DSCs and transport casks is not yet resolved, procedures are included here to show

how fuel can be returned to the spent fuel pool should that become necessary.

If a loaded DSC is dropped, then the DSC, transfer cask or fuel may have been damaged and an examination of these items shall be conducted.

The cask trailer is towed from the ISFSI to the Auxiliary Building. The trailer is positioned and readied for access by the Spent Fuel Cask Handling Crane. The cask bottom cover plate is installed and the upper halves of the skid trunnion support pillow blocks removed. The lifting yoke is attached to the crane hook, the yoke lowered and the cask upper trunnions engaged. The crane is moved toward the bottom of the cask while raising the hook, and the cask lifted from the trailer. The cask is moved to the cask washdown pit and lowered. The cask is washed to remove any dirt which may have accumulated on it during the DSC loading and transfer operations. The cask lid is unbolted and removed and set aside. Temporary shielding is installed as required to reduce personnel exposure.

The process of DSC unloading is similar to that used for loading. Dry shielded canister opening operations described below are carefully controlled in accordance with current and approved plant procedures. This operation is performed under the Calvert Cliffs Nuclear Power Plant's standard health physics guidelines for welding, grinding, and handling of potentially highly contaminated equipment. This includes the use of prudent housekeeping measures and monitoring of airborne particulates.

The automatic welding machine, with the plasma torch attached, is placed on the top cover plate and aligned with the cover plate weldment. If necessary, an exhaust hood or tent is placed over the DSC, and the exhaust routed to the existing Auxiliary Building processing systems. The seal weld between the top cover plate and the DSC shell is removed using the plasma arc-gouging system. The Auxiliary Building's ventilation system should be operating at all times. Very little swarf is produced by the plasma arc torch, but all such material will be treated and handled in accordance with the plant's low level waste procedures. The top of the tent or exhaust hood is removed, if necessary, and the automatic welding machine is removed. The DSC top cover plate is removed. A portable drill press is placed on the top of the DSC shield plug and the drill positioned over the siphon port quick connect. A hole is drilled through the siphon port plug to expose the quick connect. The drill press is repositioned over the vent port and a second hole drilled to expose the vent port quick connect. Care should be taken to avoid drilling into the quick connects. The vent port is connected to the building processing system and the DSC filled with borated water from the fuel pool through the siphon port. The cask/DSC annulus is filled with demineralized water. The automatic welding machine, the tent, and the temporary shielding are reinstalled as required. Before welding or cutting of the top shield plug begins, a small tube is inserted into the DSC vent port. A hydrogen monitor is connected to the tube to continuously sample for hydrogen gas during the top shield plug welding/cutting process. If the hydrogen concentration reaches 60% of the lower flammability limit, welding/cutting activities will stop. The DSC air space will then be purged with filtered plant air. The seal weld between the top shield plug and the DSC shell is removed in the same manner as the top cover plate.

The cask surface is cleaned of any dirt and debris which may have accumulated during the weld removal operation. The cask/DSC annulus seal is installed. The yoke is positioned over the cask, the eyebolts installed into the shield plug assembly, and a sling cable connected to the eyebolts. The shield plug assembly is slowly lifted to verify that it is easily removable from the DSC. The shield plug assembly should be lifted no higher than the top of the DSC shell. The shield plug is replaced in the DSC and the yoke engaged onto the cask trunnions. The lifting hooks are visually inspected to ensure that they are properly positioned on the trunnions. The cask is moved to above the fuel pool. Prior to lowering the cask into the pool, the pool water level is adjusted as necessary to accommodate the volume which will be displaced by the cask during the operation. The cask is lowered into the spent fuel pool. The shield plug is lifted out and the fuel assemblies are placed in the pool storage racks.

5.1.2 PROCESS FLOW DIAGRAM

Process flow diagrams for the handling operations are presented in Figures 5.1-1 and 5.1-2. The location of the operations are shown at the top of the figures.

5.1.3 IDENTIFICATION OF SUBJECTS FOR SAFETY ANALYSIS

5.1.3.1 Criticality Prevention

Criticality in the DSC is prevented through a combination of geometrical separation of the fuel assemblies, the neutron absorption capability of the guide sleeves, and administrative controls on selection of fuel to be stored in the DSC. Administrative control of fuel selection is incorporated into plant procedures and is described in Chapter 9. The criticality analysis is described in Sections 3.3.4 and 12.3.3.4.

5.1.3.2 Chemical Safety

There are no chemicals used in the NUHOMS system that require special precautions.

5.1.3.3 Operation Shutdown Modes

The NUHOMS system is totally passive and therefore, this section is not applicable.

5.1.3.4 Instrumentation

The instruments used for DSC closure operations and for monitoring the DSC insertion operation at the HSM/HSM-HB are standard industry components. They are selected to meet the design requirements of the systems of which they are a part. No instrumentation is required for operation of the ISFSI.

5.1.3.5 Maintenance Techniques

The NUHOMS system is totally passive and therefore does not require maintenance. However, to insure that the ventilation airflow is not interrupted, the HSM/HSM-HB is inspected once every 24 hours for debris in the vent inlet or outlet openings.

Periodic inspection and maintenance of the transfer equipment is performed.

5.2 SPENT FUEL HANDLING SYSTEMS

5.2.1 SPENT FUEL RECEIPT, HANDLING, AND TRANSFER

Spent fuel receipt, handling, and transfer for the Calvert Cliffs ISFSI take place in the plant Auxiliary Building. Fuel handling equipment includes the Spent Fuel Cask Handling Crane, spent fuel handling machine, transfer cask, and lifting yoke. The Spent Fuel Cask Handling Crane and the spent fuel handling machine are described in Reference 5.1. The transfer cask is described in Section 4.7.3.3 and the lifting yoke is described in Section 4.7.3.4.

Section 5.1.1 gives a detailed description of the fuel retrieval process and Figure 1.3-6 depicts the fuel handling operations for the ISFSI. The DSC is placed into the transfer cask which is lowered into the spent fuel pool using the Spent Fuel Cask Handling Crane and the lifting yoke. The fuel is retrieved from the storage racks by the spent fuel handling machine, and placed in the DSC. The transfer cask is then removed from the pool and taken to the cask washdown pit where decontamination and DSC closure operations take place. The cask is then lifted to the transfer trailer for transport to the ISFSI.

Shielding is maintained by the pool water and the transfer cask. Subcriticality is assured by the administrative procedures described in Section 9.4.1, and by the DSC design as discussed in Sections 3.3.4 and 12.3.3.4.

5.2.2 SPENT FUEL STORAGE

The transfer of the spent fuel assemblies to the ISFSI is achieved using the transfer cask, transfer trailer, cask support skid, skid positioning system, and the hydraulic ram system. The transfer cask is described in Section 4.7.3.3, the transfer trailer is described in Section 4.7.3.5, the skid positioning system is described in Section 4.7.3.6, the hydraulic ram system is described in Section 4.7.3.7, and the cask support skid is described in Section 4.7.3.9.

Section 5.1.1 gives a detailed description of the transfer of the fuel assemblies to the storage position. After the DSC is loaded with fuel, the transfer cask containing the DSC is secured to the cask support skid on the transfer trailer. The cask support skid is fastened to the trailer during transportation to the ISFSI using skid tie down brackets. A suitable tractor is used to transport the trailer to the ISFSI. The transfer cask is aligned with the HSM/HSM-HB using the skid positioning system and the DSC is inserted by the hydraulic ram.

Spent fuel loading, transfer, and storage is shown in Figure 1.3-6.

The only surveillance required for the NUHOMS system is an inspection of the air inlets and outlets performed once every 24 hours as discussed in Section 5.1.1.7.

Retrieval of the DSC from the HSM/HSM-HB is performed in a manner similar to the storage operations, using the same equipment. Retrieval operations are described in Section 5.1.1.8.

5.3 OTHER OPERATING SYSTEMS

5.3.1 OPERATING SYSTEM

The NUHOMS system is a passive storage system and requires no operating systems other than those systems used in transferring the DSC to and from the HSM/HSM-HB.

5.3.2 COMPONENT/EQUIPMENT SPARES

As stated in Section 8.2, the Calvert Cliffs ISFSI, including the air outlet shielding blocks, is designed to withstand all events including the effects of tornado missiles. Therefore, no component or equipment spares are required for the NUHOMS system.

5.4 OPERATION SUPPORT SYSTEMS

The NUHOMS system is a self-contained system and requires no effluent processing systems during operations.

5.4.1 INSTRUMENTATION AND CONTROL SYSTEMS

There are no instrumentation and control systems used during storage. The instrumentation and controls necessary for fuel handling and HSM/HSM-HB loading are described in Section 5.1.3.4.

5.4.2 SYSTEM AND COMPONENT SPARES

Since there are no instrumentation and control systems during storage, no system component spare parts are required.

5.5 CONTROL ROOM AND CONTROL AREAS

There is no Control Room or control areas for the NUHOMS system.

5.6 ANALYTICAL SAMPLING

There is no analytical sampling used with the NUHOMS system.

5.7 REFERENCES

5.1 Calvert Cliffs Nuclear Power Plant, Updated Final Safety Analysis Report, Docket Nos. 50-317 and 50-318, Baltimore Gas and Electric Company

5.2 Letter from Mr. G. C. Creel (BGE) to Director, Office of Nuclear Material Safety and Safeguards (NRC), dated December 20, 1990, Response to NRC's Comments on the Safety Analysis Report (SAR) for BGE's License Application for Calvert Cliffs Independent Spent Fuel Storage Installation (ISFSI)